

Claims:

What is claimed is:

1 1. A method for allocating resources of a service provider to a
2 plurality of users of the service provider in a data processing
3 system wherein the resources are maintained in a resource pool
4 when not allocated to a user and comprise a plurality of first
5 and second resources, each second resource being associated with
6 a first resource for use together with the associated first
7 resource, and wherein, to invoke performance of a service by the
8 service provider, a user issues a first resource request,
9 requesting a first resource, one or more second resource
10 requests, requesting one or more second resources, and, following
11 receipt of the requested resources, issues a service request
12 including the received first resource and at least one received
13 second resource, requesting performance of the service, the
14 method comprising steps of:

15 dispensing dummy resources to a user in response to the
16 first and second resource requests, each dummy resource
17 representing a resource requested by the user; and

18 in response to the service request from the user, allocating
19 corresponding resources from the resource pool to dummy resources
20 dispensed to the user.

1 2. A method as claimed in claim 1 wherein corresponding
2 resources from the resource pool are allocated to dispensed dummy
3 resources according to the best match between the set of
4 resources represented by the dummy resources dispensed to the
5 user and groups of associated first and second resources in the
6 resource pool.

1 3. A method as claimed in claim 1 including, in response to the
2 first and second resource requests from a user, reserving a
3 resource in the resource pool corresponding to each resource
4 requested by the user.

1 4. A method as claimed in claim 3 including:

2 (a) in response to a first resource request from a user,
3 determining whether the resource pool contains an unreserved
4 first resource, if so reserving that first resource for the user,
5 and if not obtaining a new first resource from the service
6 provider, adding the new first resource to the resource pool and
7 reserving that resource for the user;

8 (b) in response to a the second resource request from the
9 user, determining whether a first group of resources, comprising
10 the first resource reserved for the user and any second resources
11 associated with that first resource in the resource pool,
12 contains an unreserved second resource corresponding to the
13 resource requested in the second resource request, if so
14 reserving that second resource for the user, and if not:

15 (c) determining whether the resource pool contains a second
16 group of associated, unreserved first and second resources, which
17 group comprises all the resources requested by the user, and if
18 so reserving those resources in the second group for the user and
19 removing the reservations on resources previously reserved for
20 the user.

1 5. A method as claimed in claim 4 wherein, if it is determined
2 in step (c) that the resource pool does not contain the second
3 group, the method includes obtaining from the service provider a
4 new second resource, associated with the reserved first resource,
5 corresponding to the resource requested in the second resource

6 request, adding the new second resource to the resource pool and
7 reserving that resource for the user.

1 6. A method as claimed in claim 4 wherein, if it is determined
2 in step (c) that the resource pool does not contain the second
3 group, the method includes determining whether:

4 (1) the resource pool contains a third group of associated
5 first and second resources which includes all the
6 resources requested by the user and in which one or
7 more of the resources is reserved; and

8 (2) the first group of resources includes a resource
9 corresponding to each reserved resource in the third
10 group;

11 if so, interchanging the reservations between the first and
12 third groups and reserving for the user the resource in the third
13 group corresponding to the resource requested in the second
14 resource request, and if not obtaining from the service provider
15 a new second resource, associated with the reserved first
16 resource, corresponding to the resource requested in the second
17 resource request, adding the new second resource to the resource
18 pool and reserving that resource for the user.

1 7. A method as claimed in claim 4 wherein, if it is determined
2 in step (c) that the resource pool does not contain the second
3 group, the method includes steps of:

4 determining whether the resource pool contains a plurality
5 of further groups of associated first and second resources, one
6 or more of the further groups containing resources reserved for
7 respective further users, such that the reservations for the
8 users may be transferred between groups among the first and

9 further groups to obtain a group which has one or more
10 reservations for the user that issued the second resource request
11 and which includes an unreserved second resource corresponding to
12 the resource requested in the second resource request; if so,
13 transferring the reservations between the groups and reserving
14 the unreserved second resource for the user that issued the
15 second resource request; and if not obtaining from the service
16 provider a new second resource, associated with the first
17 resource reserved for that user, corresponding to the resource
18 requested in the second resource request, adding the new second
19 resource to the resource pool and reserving that resource for the
20 user.

1 8. A method as claimed in claim 3 including, in response to the
2 service request from a user, allocating the resources reserved
3 for the user to the corresponding dummy resources dispensed to
4 the user.

1 9. A method as claimed in claim 1 including replacing the dummy
2 resources in the service request by the respective allocated
3 resources for forwarding to the service provider.

1 10. A method as claimed in claim 1 wherein the first resources
2 comprise connection handles, each identifying a connection
3 between the service provider and a user, and wherein the second
4 resources comprise object handles, each identifying an object to
5 be used by the service provider in performance of a service for
6 the associated connection.

1 11. Apparatus for allocating resources of a service provider to
2 a plurality of users of the service provider in a data processing
3 system wherein the resources are maintained in a resource pool
4 when not allocated to a user and comprise a plurality of first
5 and second resources, each second resource being associated with
6 a first resource for use together with the associated first
7 resource, and wherein, to invoke performance of a service by the
8 service provider, a user issues a first resource request,
9 requesting a first resource, one or more second resource
10 requests, requesting one or more second resources, and, following
11 receipt of the requested resources, issues a service request
12 including the received first resource and at least one received
13 second resource, requesting performance of the service, the
14 apparatus comprising:

15 a memory for storing the resources; and

16 control logic for receiving the first, second and service
17 requests from the users, the control logic being adapted:

18 to maintain the resources in a resource pool of the memory
19 when the resources are not allocated to a user;

20 to dispense dummy resources to a user in response to the
21 first and second resource requests from the user, each dummy
22 resource representing a resource requested by the user; and

23 in response to the service request from the user, to
24 allocate corresponding resources from the resource pool to dummy
25 resources dispensed to the user.

1 12. Apparatus as claimed in claim 11 wherein the control logic
2 is adapted to allocate corresponding resources from the resource
3 pool to dispensed dummy resources according to the best match

4 between the group of resources represented by the dummy handles
5 dispensed to the user and groups of associated first and second
6 resources in the resource pool.

1 13. Apparatus as claimed in claim 11 wherein the control logic
2 is further adapted to reserve a resource in the resource pool
3 corresponding to each resource requested by the user in the first
4 and second resource requests.

1 14. Apparatus as claimed in claim 13 wherein the control logic
2 is adapted such that:

3 (a) in response to a first resource request from a user, the
4 control logic determines whether the resource pool contains an
5 unreserved first resource, if so the control logic reserves that
6 first resource for the user, and if not the control logic obtains
7 a new first resource from the service provider, adds the new
8 first resource to the resource pool and reserves that resource
9 for the user;

10 (b) in response to a the second resource request from the
11 user, the control logic determines whether a first group of
12 resources, comprising the first resource reserved for the user
13 and any second resources associated with that first resource in
14 the resource pool, contains an unreserved second resource
15 corresponding to the resource requested in the second resource
16 request, if so the control logic reserves that second resource
17 for the user, and if not:

18 (c) the control logic determines whether the resource pool
19 contains a second group of associated, unreserved, first and
20 second resources which group comprises all the resources
21 requested by the user, and if so the control logic reserves those

22 resources in the second group for the user and removes the
23 reservations on resources previously reserved for the user.

1 15. Apparatus as claimed in claim 14 wherein, if it is
2 determined in step (c) that the resource pool does not contain
3 the second group, the control logic obtains from the service
4 provider a new second resource, associated with the reserved
5 first resource, corresponding to the resource requested in the
6 second resource request, adds the new second resource to the
7 resource pool and reserves that resource for the user.

1 16. Apparatus as claimed in claim 14 wherein, if it is
2 determined in step (c) that the resource pool does not contain
3 the second group, the control logic determines whether:

4 (1) the resource pool contains a third group of associated
5 first and second resources which includes all the
6 resources requested by the user and in which one or
7 more of the resources is reserved; and

8 (2) the first group of resources includes a resource
9 corresponding to each reserved resource in the third
10 group;

11 if so, the control logic interchanges the reservations
12 between the first and third groups and reserves for the user the
13 resource in the third group corresponding to the resource
14 requested in the second resource request, and if not the control
15 logic obtains from the service provider a new second resource,
16 associated with the reserved first resource, corresponding to the
17 resource requested in the second resource request, adds the new
18 second resource to the resource pool and reserves that resource
19 for the user.

1 17. Apparatus as claimed in claim 14 wherein, if it is
2 determined in step (c) that the resource pool does not contain
3 the second group, the control logic determines whether the
4 resource pool contains a plurality of further groups of
5 associated first and second resources, one or more of the further
6 groups containing resources reserved for respective further
7 users, such that the reservations for the users may be
8 transferred between groups among the first and further groups to
9 obtain a group which has one or more reservations for the user
10 that issued the second resource request and which includes an
11 unreserved second resource corresponding to the resource
12 requested in the second resource request; if so, the control
13 logic transfers the reservations between the groups and reserves
14 the unreserved second resource for the user that issued the
15 second resource request; and if not the control logic obtains
16 from the service provider a new second resource, associated with
17 the first resource reserved for that user, corresponding to the
18 resource requested in the second resource request, adds the new
19 second resource to the resource pool and reserves that resource
20 for the user.

1 18. Apparatus as claimed in claim 13 wherein the control logic
2 is adapted to allocate the resources reserved for the user to the
3 corresponding dummy resources dispensed to the user in response
4 to the service request from the user.

1 19. Apparatus as claimed in claim 11 wherein the control logic
2 is adapted to replace the dummy resources in the service request
3 by the respective allocated resources for forwarding to the
4 service provider.

1 20. Apparatus as claimed in claim 11 wherein the first resources
2 comprise connection handles, each identifying a connection
3 between the service provider and a user, and wherein the second

4 resources comprise object handles, each identifying an object to
5 be used by the service provider in performance of a service for
6 the associated connection.

1 21. Data processing apparatus comprising:

2 a service provider for performing services for a plurality
3 of users, the service provider being operable to supply resources
4 for use by the users, the resources comprising a plurality of
5 first and second resources, each second resource being associated
6 with a first resource for use together with the associated first
7 resource, and

8 a resource dispenser arranged to receive the resources
9 supplied by the service provider, the resource dispenser
10 comprising apparatus for allocating resources of a service
11 provider to a plurality of users of the service provider in a
12 data processing system wherein the resources are maintained in a
13 resource pool when not allocated to a user and comprise a
14 plurality of first and second resources, each second resource
15 being associated with a first resource for use together with the
16 associated first resource, and wherein, to invoke performance of
17 a service by the service provider, a user issues a first resource
18 request, requesting a first resource, one or more second resource
19 requests, requesting one or more second resources, and, following
20 receipt of the requested resources, issues a service request
21 including the received first resource and at least one received
22 second resource, requesting performance of the service, the
23 apparatus comprising:

24 a memory for storing the resources; and

25 control logic for receiving the first, second and service
26 requests from the users, the control logic being adapted:

27 to maintain the resources in a resource pool of the memory
28 when the resources are not allocated to a user;

29 to dispense dummy resources to a user in response to the
30 first and second resource requests from the user, each dummy
31 resource representing a resource requested by the user; and

32 in response to the service request from the user, to
33 allocate corresponding resources from the resource pool to dummy
34 resources dispensed to the user.

1 22. Apparatus as claimed in claim 21 wherein the service
2 provider is a message queuing program for performing message
3 queuing services for the users.

1 23. Apparatus as claimed in claim 21 wherein the service
2 provider is a database for performing database services for the
3 users.

1 24. A computer program product comprising a computer usable
2 medium having computer program code therein which, when run in a
3 data processing system, carries out a method for allocating
4 resources of a service provider to a plurality of users of the
5 service provider in a data processing system wherein the
6 resources are maintained in a resource pool when not allocated to
7 a user and comprise a plurality of first and second resources,
8 each second resource being associated with a first resource for
9 use together with the associated first resource, and wherein, to
10 invoke performance of a service by the service provider, a user
11 issues a first resource request, requesting a first resource, one
12 or more second resource requests, requesting one or more second

13 resources, and, following receipt of the requested resources,
14 issues a service request including the received first resource
15 and at least one received second resource, requesting performance
16 of the service, the method comprising steps of:

17 dispensing dummy resources to a user in response to the
18 first and second resource requests, each dummy resource
19 representing a resource requested by the user; and

20 in response to the service request from the user, allocating
21 corresponding resources from the resource pool to dummy resources
22 dispensed to the user.